Has “toilet to tap” water reached its moment in the sun?

By Ted J. Rulseh
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Recent advances in technology and design mean treating municipal wastewater and reusing it for drinking water, irrigation, industry, and other applications could significantly increase available water resources, especially in coastal areas facing water shortages, says a new report from the National Research Council.

“Water Reuse: Potential for Expanding the Nation's Water Supply through Reuse of Municipal Wastewater” adds that using reclaimed water to augment drinking water supplies has significant potential to help meet future needs. New analyses suggest that the health risks of exposure to chemical contaminants and disease-causing microbes from wastewater reuse do not exceed, and in some cases may be significantly lower than, the risks of existing water supplies.

“Wastewater reuse is poised to become a legitimate part of the nation's water supply portfolio given recent improvements to treatment processes," said R. Rhodes Trussell, chair of the committee that wrote the report and president of Trussell Technologies in Pasadena, Calif. “Although reuse is not a panacea, wastewater discharged to the environment is of such quantity that it could measurably complement water from other sources and management strategies.”

The report examines a wide range of reuse applications, including potable water, non-potable urban and industrial uses, irrigation, groundwater recharge, and ecological enhancement. The committee found that many communities have already implemented water reuse projects that are well established and generally accepted.

Potable water reuse projects account for only a small fraction of the volume of water being reused, but many drinking water treatment plants draw water from a source that contains wastewater discharged by a community upstream. (This practice is not officially acknowledged as potable reuse.)

The report outlines wastewater treatment technologies for mitigating chemical and microbial contaminants, including engineered and natural treatment systems. These processes can be used to tailor wastewater reclamation plants to the quality needs of intended reuse applications.

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The concentrations of chemicals and microbial contaminants in reuse projects can be comparable to or lower than those commonly present in many drinking water supplies. The committee emphasized the need for process reliability and careful monitoring to ensure that reclaimed water meets quality objectives for its use.

Costs of water reuse for potable and non-potable applications vary widely because they depend on site-specific factors, the committee said. Water reuse projects tend to be more expensive than most water conservation options and less expensive than seawater desalination and other supply alternatives.

Although reclaimed water often costs more than water from current sources, the report urges water authorities to consider costs and benefits beyond dollars when assessing reuse projects. For example, water reuse systems used with a water conservation program could reduce seasonal peak drinking water demands. Depending on specific designs and pumping requirements, reuse projects could have a smaller carbon footprint than existing supply alternatives or reduce water flows to downstream users and ecosystems.

Water reuse regulations differ by state and are not based on risk assessment, the report says. Adjustments to the federal regulatory framework could help ensure a high level of public health protection, provide a consistent minimum level of protection across the nation, and increase public confidence in potable and non-potable water reuse.

The report notes that existing legislative tools could be applied to improve the quality of water for reuse, including updating the National Pretreatment Programs list of priority pollutants to include a wider inventory of known toxic substances. It lists 14 areas of research to help guide appropriate applications of water reuse.

The study was sponsored by the U.S. EPA, the U.S. Bureau of Reclamation, the National Science Foundation, the National Water Research Institute, the Centers for Disease Control and Prevention, the Water Research Foundation, Orange County Water District, Orange County Sanitation District, the Los Angeles Department of Water and Power, Irvine Ranch Water District, West Basin Water District, Inland Empire Utilities Agency, Metropolitan Water District of Southern California, Los Angeles County Sanitation Districts, and Monterey Regional Water Pollution Control Agency.

Access the report at http://www.nap.edu/catalog.php?record_id=13303